Glossary

June 26, 2013 Version

Glossary of words and terms used in writings about NASA Program Management and Program Planning & Control

Acquisition	To gain possession of space flight products by development carried out over a defined life cycle i.e., in accordance with the NASA Program/Project life cycle Formulation phases Pre-Phase A through Phase B, and Phases C and D only of Implementation. (Major Acquisition = life cycle value > $250M)
Affordability	Conduct a Program at a cost constrained by the maximum resources the organization can allocate for the capability; a capability is the facility or potential for an indicated use or deployment. (Memorandum for Acquisition Professionals, Undersecretary of Defense, 9/14/2010) Affordability objectives for NASA Human Space Flight Programs are documented in testimony provided by the NASA Administrator to the Committee on Science, Space and Technology, U.S. House of Representatives, July 12, 2011.
Agency Baseline Commitment	Establishes and documents an integrated set of requirements, cost, schedule, technical content, and an agreed-to JCL, that forms the basis for NASA's commitment with the external entities of OMB and Congress. ABC is set as a cost range in the Decision Memorandum issued following KDP C and as a cost value in the Decision Memorandum following KDP D. (NID for NPR 7120.5D) See also Unallocated Future Expense and Program Baseline.
Agent-Based Modeling	A methodology combining game theory, complex systems, emergence, computational sociology, multi-agent systems, Monte Carlo methods, discrete event simulation and object oriented programming to provide a capability to 'show' emergent connections between systems and components by linking knowledge about individual behaviors into overall system-level outcomes.
Assumptions	A belief or condition forming a basis for end-state values that must be formally captured and documented at a Program level. Assumptions, especially those made in the early phases of a Program, affect the likelihood of achieving the technical outcome and staying within schedule and cost constraints.
Baseline	An agreed-to set of requirements, cost, schedule, designs, documents, etc. that will have changes controlled through a formal approval and monitoring process. (NID for NPR 7120.5D) See also Program Baseline.
Baseline Attributes	Information about technical, schedule and cost end-point values (Program Baseline) that is used by an Enterprise or a Program/Project Manager to manage performance. Attributes are controlled by management discretion and not by formal process; and they must be regularly reviewed for continuing applicability because, for example, an assumption about technology development—which is an attribute of a technical baseline element--that is no longer valid becomes a risk to future performance.

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Baseline Performance Review (BPR)	An Agency-level independent assessment to inform senior leadership of performance and progress toward the Agency's mission and program/project performance; encompassing a review of cross-cutting mission support issues. (NID for NPR 7120.5D)
Behavior	Outcomes emerging from the interaction of a system and its environment, and from local interaction between system participants and their environments; each following rules and without any central coordination.
Business Rhythm	The time required for suppliers to capture and submit performance reports to a PP&C Office plus the time required for a PP&C Office to process those data and report results to the Program. Business rhythm can also refer to the frequency of reviews (i.e., weekly, monthly or quarterly) held with the Program Manager. Moreover, business rhythm can also refer to the elapsed time required to process a change to a contract or to an agreement.
Cause	Sequence of events and interactions (pathways) that lead to outcomes that can be either intended, or unintended and unexpected.
Complexity	An expression used to characterize something with many parts in a complicated arrangement of structured interactions.[1]
Concept of Operations	A document describing the characteristics of a proposed system from the viewpoint of an individual or organization that will use that system. It is used to communicate the quantitative and qualitative system characteristics to all Stakeholders.
Contract Baseline	End-state values of cost and schedule constraints for the technical requirements written into a governing contract. Contract Baseline equals Program Baseline at the time a contract is issued but then lags the Program Baseline as work is performed in the Formulation Phase of the life cycle. The contractor can perform only work that is both within the scope of work in the contract and authorized by the government.
Contractor/Supplier Performance	A measure of how well the group of contractors and suppliers is currently fulfilling obligations along with projections for future performance. A contractor is a commercial entity having a mutually binding legal relationship obligating the seller to furnish the supplies or services and the buyer to pay for them. A supplier provides product and services to a customer and may be a contractor, grantee, NASA Center performing organization, university, international partner, or another government agency.

[1] "In 2004, I organized a panel discussion of complexity … The panel consisted of well-known scientists ... The first question was, "How do you define *complexity*?" … Each Panel member then proceeded to give a different definition of the term. … There is not yet a single science of complexity but rather several different sciences of complexity with different notions of what complexity means." (Mitchell 2009, 94-95)

Controlled Milestones	Scheduled events for the delivery of project, program or cross-program products such as analyses, models, emulators, hardware and software deliveries etc., that can be changed only by formal process.
Cost and Workforce Performance Reports	The results of an evaluation of actual resource expenditures (Program's cost and workforce) compared to planned amounts for a consistent time period. See Integrated Programmatic Resources.
Cost Estimating	The approximation of the cost of a program, programs, or operation. The cost estimate is the product of a cost estimating process. The cost estimate has a single total value and may have identifiable component values. Cost overruns can be avoided with a credible, reliable, and accurate cost estimate. Use of established methodologies and tools to calculate cost based on technical and schedule alternatives; examples would include Estimate at Completion (EAC) and Life-Cycle Cost (LCC).
Cost Overrun	A cost overrun is an unexpected cost incurred in excess of a budgeted amount due to an underestimation of the actual cost during budgeting because of technical, psychological, and political factors. Technical factors include scope creep, where requirements increase, imperfect forecasting techniques, and inadequate data; psychological factors include optimism in planning and forecasting; and political factors view overrun as a result of strategic misrepresentation of scope or budgets.
Design Readiness aka Design Stability	Readiness is the condition of being prepared or available for service, action or progress. Stability is the absence of change. Design stability is a characterization of preparedness for production; from Section 3, NPR 5900.1: Design stability includes the availability of drawings, technical data, hardware and software documentation, production process, test and quality specifications, tools, test equipment, materials required to ensure competition, and liability assumed by the Government; Measurements of stability from OCE response to GAO include: % use of mass margin Vs. planned use, % use of power margin Vs. planned use, % overdue project RFA's; and % increase in post-CDR drawings. (See National Aeronautics and Space Administration Advisory Council Audit, Finance, and Analysis Committee Report, p 33, May 5, 2011)
Earned Value Management (EVM)	A tool for measuring and assessing project performance through the integration of technical scope with schedule and cost objectives during the execution of the project. EVM provides quantification of technical progress, enabling management to gain insight into project status and project completion costs and schedules. Two essential characteristics of successful EVM are EVM system data integrity and carefully targeted monthly EVM data analyses. (NASA/SP-2010-3406)

Emergence	Phenomena that can arise at the system level due to the interaction of participants working within a local environment while also interacting at the same time with other participants working within their own environment; all operating together simultaneously in a common environment.
Enterprise System Integrated Schedule (ESIS)	The ESIS is a high-level, logically-linked integrated schedule inclusive of both the Enterprise and Programs content depicting major elements used for describing critical path elements, identifying relationships and interdependencies, and for conducting what-if analysis of scenarios to determine sensitivities to alternative management actions. See also Integrated Schedule.
Error	Action failed to achieve its intended outcome; (organizational) the natural culmination of a series of events or circumstances (cascading) which invariable occurs in a fixed and logical order.
Failure (Program Management)	Occurrence of one or more of overrun of cost, delay of schedule or compromise in capability (technical) in large-scale Programs that develop space flight technology to the extent that stakeholder action is required to either terminate or rescue the Program; any change in resource requirements (cost and/or schedule growth) sufficient to require a report to congress and/or a re-baseline of cost, schedule and technical constraints; or any unfavorable Decision Memorandum at any one of the five Key Decision Points (A, B, C , D or E).
Failure Mode and Effects Analysis (FMEA)	Step-by-step approach for identifying all possible failures in a system. Mode is the way in which failure occurs. Effects analysis is studying the consequences of failures.
Forecasts	Statements of alternative future performance based on extrapolations of, or projections on, past and current values of Functional Data Products (trends).
Functional Data Products	Products that capture and report variance calculated by comparing actual, as reported by a Program contractor or NASA participating organization, with planned performance for that function. Note: Functional Data Products are historic and are applicable for the time period for which 'actual' values were reported
Health of the Enterprise	Synonym for Integrated Analysis: A characterization of current and future Enterprise performance that informs management of threats to achieving the Baseline by 1) staying on budget, 2) maintaining schedule, and 3) preserving technical content.

Heritage Content	NASA capitalized assets planned for re-use in implementing a Program. The costs of acquiring, constructing, improving, reconstructing, or renovating are Program expenses. Assumptions regarding use such as availability, condition, and etc. which would impact cost, schedule and required capability if incorrect should be documented and managed as a risk to the Enterprise.
Human Error/ Human Factors Analysis	Human error is a mental or physical activity of an individual that fails to achieve its intended outcome. Types of human error include skill-based, decision and perceptual. Human Factors Analysis is a structured methodology for organizing information and assessing cause.
Independent Assessments	Characterizations of current and future performance developed by alternative methodologies such as identifying critical flight-product elements and subsystems, and tracking actual development compared to planned development developed by personnel applying their expertise impartially and without conflict of interest or inappropriate interference or influence.
Integrated Baseline Review (IBR)	A risk-based review conducted by the Program/Project Management to ensure a mutual understanding between the customer and supplier of the risks inherent in the supplier's PMB and to ensure the PMB is realistic for accomplishing all the authorized work within the authorized schedule and budget. (NASA/SP-2010-3406)
Integrated Products List	List of all integration products that have shared responsibilities or requirements used by an Enterprise to plan and track integrated products and to identify the OPR and control board for each product.
Integrated Analysis	A characterization of current and future Enterprise performance that informs management of threats to achieving the Baseline by 1) staying on budget, 2) maintaining schedule, and 3) preserving technical content.
Integrated Programs Baseline	The time-phased cost plan for accomplishing all authorized work scope in all Enterprise programs life cycle and includes both NASA internal costs and supplier costs. (PM Handbook)
Integrated Programmatic Resources	A performance Measure that characterizes the actual versus planned cost and workforce performance for the Enterprise comprised of input from each of the Programs and the ESD RMO.

Integrated Risk Posture/PRA/QRA	Aka Risk Assessment. A Performance Measure showing the relative ranking of risk item(s) that determines: (1) what can go wrong; (2) how likely it is to occur; (3) what the consequences are; and (4) what the uncertainty is that are associated with the likelihood and consequences. (NID for NPR 7120.5D) PRA applies to S&MA while QRA applies to budget and schedule.
Integrated Schedule	Aka Integrated Master Schedule: A Performance Measure comprising a logical network-based schedule that reflects the total scope of work, traceable to a WBS, as discrete and measurable tasks/milestones and supporting elements that are time phased through the use of valid durations and well-defined interdependencies. (NID for NPR 7120.5D)
Integrated Technical Resources	A performance Measure that characterizes the actual versus planned performance in managing vehicle resources inclusive of mass, structural loads, power, pressurized volume, communication channels, etc.
Interdependent	A relationship in which scheduled task items are mutually dependent on those of others including key (controlled) milestones for program activities and deliverables such as analysis products, models, emulators, hardware and software deliveries, launch dates, etc.
Key Decision Point (KDP)	The event at which a Decision Authority determines the readiness of a program/ project to progress to the next phase of the life cycle or to the next KDP. (NPR 7120.5E)
Latent Conditions	Underlying factors and organizational influences conducive to failure including: conditions that directly impact individual performance; conditions that directly impact team performance; and the aggregate of surrounding things that impact individual and team performance. Latent conditions are the rules and regulations imposed on persons performing work and exist at the Institutional and Agency level.
Life Cycle Cost	The total of the direct, indirect, recurring, nonrecurring, and other related expenses incurred or estimated to be incurred over the entire life cycle inclusive of design, development, verification, production, deployment, prime mission operation, maintenance support and disposal of a program including closeout, but not extended operations. (NID for NPR 7120.5D)
Management System aka NASA Program Management System	A hierarchical organization of organizations each comprised of multiple participants with individual, diverse agendas and environments, coordinating their actions so as to exchange information, act, and interact in a nonlinear and dynamical fashion to develop new technology for space flight.[2]

[2] Diversity includes the multiple cultures of International Partners

Manufacturing Complexity	A characterization of the degree of difficulty anticipated in producing flight product including materials, tooling, processing, and etc. which could impact cost, schedule and required capability. Manufacturing is the industrial production of goods using labor and machines, tools, chemical and biological processing, in which raw materials are transformed into finished goods, which may be used for manufacturing other, more complex products. Complexity is a characterization of something with many parts in an intricate arrangement.
Metric	The assignment of a number to an object or to an event that communicates information about the measured status or performance of that object or event compared to planned or expected status or performance of that object or event for the time period when the measurement was taken. Metrics can also refer to a set of measurements used to characterize, evaluate and communicate program/project performance.
Nonlinear Dynamical System (NDS)	A general systems theory for describing, modeling, and predicting change that allows the possibility that small inputs at the right time can produce a dramatic impact and that large impacts at the wrong time can produce nothing at all; and that there are many possible patterns of change. NDS is a combination of mathematics, biology, physics, and social science.
Organization <u>Synonyms</u> Organization system Management System	The following description is thought to be especially apt to the NASA Management System hierarchy of organizations in today's environment[3]: *Organizations are constructed as tools for a specific kind of collective action. They consume substantial resources in simply maintaining their structure. Organizational politics complicates the relation between technical need for production and the actual distribution of resources. The resulting competition is especially severe in times of contraction or decline. Because allocations within organizations spark intense political contests, organizational action depends on the history or prior allocations and on the nature of current political conditions. Organizations develop lives of their own, with action at least partly disconnected from observable goals, from demands of relevant environments, and often from the intentions of organizational leaders.*
Performance Management	A determination of the Program's actual position relative to its planned position at any point in time, assessing the probable impact of the current position on 1) where the Program <u>*wants*</u> to be in the near-term and 2) where the Program <u>*needs*</u> to be in the long-term, and 3) making decisions to achieve the planned outcome.
Program Planning Budget & Execution (PPB&E)	The process NASA uses to: develop Agency Strategic Goals and performance plans; formulate the Annual budget; and develop fully executable Agency Operating and Execution Plans throughout the years of execution. (NPR 9420.1)

[3] Hannan MT, Freeman J. *Organizational Ecology*. Cambridge MA: Harvard University Press; 1989.

Program Planning and Control (PP&C)	A Program Management function responsible for performing budget and resource management and performance management, for supporting conceptual studies, program planning and life cycle reviews, and for providing the operating infrastructure.
Probabilistic Risk Assessment (PRA)	A structured, logical analysis methodology used for identifying and assessing risks in complex technological systems. A PRA provides a modeling framework that interfaces with or includes the disciplines used to conduct health, safety, and mission assurance analyses including hazard analysis, failure mode and effects analysis, and reliability analysis. (NPR 8705.5A)
Production Readiness	The condition of being prepared or available for service, action or progress. Production readiness is a characterization of preparedness for production.
Program Baseline	Configuration controlled end-state values of cost and schedule allocations for the technical requirements to be implemented over a defined Program life cycle. The Program Baseline is the Agency Baseline Commitment. The Program Manager is constrained to implement the Program within those values. See also Agency Baseline Commitment.
Program Commitment Agreement (PCA)	The contract between the Associate Administrator and the responsible MDAA that authorizes transition from Formulation to Implementation of a program. (NID for NPR 7120.5D)
Programmatic	Of, relating to, or having a program. Following an overall plan or schedule: a step-by-step, disciplined approach to problem solving. Refers to the collection of Programs within the Enterprise inclusive of both technical and non-technical (i.e., business) content.
Relationship with Suppliers	An evaluation of how effectively a group of contractors and suppliers is communicating and interacting in fulfilling obligations along with projections for continuing effectiveness. See also Contractor/Supplier Performance
Requirement	The agreed upon need, desire, want, capability, capacity, or demand for personnel, equipment, facilities, or other resources or services by specified quantities for specific periods of time or at a specified time. (NPR 7123.1)
Reserves	Amount set apart and kept back for future use or for a special purpose. Reserves are associated with budget; margins are reserves associated with schedule and technical resources.

Resource Baseline	The time-phased cost and schedule elements of a Program Baseline for accomplishing all authorized work scope throughout a defined life cycle including both NASA internal costs and supplier costs.
Risk Management including Mitigation	Inclusive of risk-informed decision making (RIDM) and continuous risk management (CRM) in an integrated framework. RIDM informs decisions through better use of risk and uncertainty information in selecting alternatives and establishing baseline requirements. CRM manages risks to ensure that safety, technical, cost, and schedule requirements are met. (NID for NPR 7120.5D)
Schedule Delay	A difference between a desired time of completion and the actual time. In NASA Programs it refers to a difference in the planned completion date versus the actual completion date, which is later in time.
Schedule Performance Reports	The results of an evaluation of milestones and events that were achieved compared to planned schedule for achievement for a consistent time period.
Software Complexity	A characterization of the degree of difficulty anticipated for software DDT&E in terms of impact to cost, schedule and required capability. Software is computer programs, procedures, rules and associated documentation and data pertaining to the development and operation of a computer system. Complexity is a characterization of something with many parts in an intricate arrangement. (NPD 7120.4)
Standing Review Board (SRB)	The body responsible for conducting independent reviews (life cycle and special) of a program/project and providing objective, expert judgments to the convening authorities. (NPR 7120.5E)
SRB Terms of Reference (ToR)	A document specifying the nature, scope, schedule and ground rules for an independent review or independent assessment performed by a SRB. (PM Handbook)
Status	Position in relation to planned performance; or the state or condition of the item being examined.
Strategic Assessments	An analysis of technical, schedule and cost 'what-ifs' used to test assumptions, to determine the impact of alternatives on the Programs execution, to isolate sensitivities, or to establish plans for dealing with contingencies (re-planning). The Enterprise 'learns' from strategic assessments and the knowledge gained feeds directly into tools and strategy for operations; and hence into the definition of the trade space used for Performance Management.

Supplier (includes Contractor)	An organization that provides product and services to a customer and may be a contractor, grantee, NASA Center performing organization, university, international partner, or another government agency. A contractor is a commercial entity having a mutually binding legal relationship obligating the seller to furnish the supplies or services and the buyer to pay for them.
System/ Systems Thinking	A group of interacting, interrelated, or interdependent elements forming a complex whole. Systems thinking is a discipline for identifying interrelationships and patterns of change.[4]
Technical Performance	The set of critical or key performance parameters that are monitored by comparing the current actual achievement of the parameters with that planned at the current time and on future dates. Used to confirm progress and identify deficiencies that might jeopardize meeting a system requirement. Assessed parameter values that fall outside an expected range around the anticipated values indicate a need for evaluation and corrective action. (NPR 7123.1A)
Technology Development/ Readiness Level	A scale to measure the maturity of a technology. TRLs range from 1, Basic Technology Research, to 9, Systems Test, Launch and Operations. Typically, a TRL of 6 (i.e., technology demonstrated in a relevant environment) is required for a technology to be integrated into an SE process. (NPR 7123.1A)
Trade Space	The set of program and system parameters, attributes, and characteristics required to satisfy performance standards (Defense Acquisition University). A three-dimensional environment in which the relative value and direction of cost, schedule and technical performance are managed to achieve the required outcome.
Unallocated Future Expense (UFE)	The portion of estimated costs required to meet specified confidence level that cannot yet be allocated to the specific program WBS sub-elements because the estimate includes probabilistic risk and specific needs that are not known until these risks are realized. (PM Handbook)
Uncertainty	Doubt. Limited knowledge where it is impossible to exactly describe an existing state, a future outcome, or more than one possible outcome. In chaotic (complex, adaptive) systems, uncertainties in measurements of initial conditions can result in huge errors in long-term predictions.
UFE Allocations	UFE assigned to a Program by the Enterprise.

[4] (Senge 1990) Senge PM. *The Fifth Discipline*. New York NY: Doubleday; 1990

UFE Applied	Amount of allocated UFE applied by a Program to deal with a realized risk.
Violation	Willful disregard for governing rules and regulations; can be both habitual and tolerated by a governing authority, or neither typical of the individual nor condoned by authority.